Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Canceled)

2. (Currently Amended) ~~The method of claim 1~~ A method of monitoring an industrial process using a partial least squares approach comprising:

constructing predictor and response matrices from reference data of the process, the predictor matrix being comprised of signals of the manipulated and measured disturbance or cause variables of the process (predictor variables), and the response matrix being comprised of the controlled or effect variables of the process (response variables),

decomposing the predictor and response matrices into rank one component matrices, each of said component matrices being comprised of a vector product in which one vector (the score vector) describes the variation and the other (the loading vector) the contribution of the score vector to the predictor or response matrix,

decomposition being performed by creating a parametric regression matrix based upon iterations of the decomposition of the predictor and response matrices,

characterized by creating generalized t-scores which describe any significant variation of the process including variations of the predictor and response variables, and generalized residual scores which represent the prediction error of the partial least squares model and residuals of the predictor matrix, and

plotting the generalized t-scores and the generalized residual scores over time to generate a monitoring chart for visual display,

wherein the generalized scores are calculated by constructing an augmented matrix, denoted here by Z and of the form $Z = [Y \vdots X]$, where X is the predictor matrix and Y is the

response matrix, and constructing a score matrix $T_n = T_n^{\circ} - E_n^{\circ}$ in which T_n° and E_n° are generally of the form:

$$T_n^{\circ} = [Y \vdots X][B_{PLS}^{(n)} \vdots \Im]' R_n$$

$$E_n^{\circ} = [E_n \vdots F_n][B_{PLS}^{(n)} \vdots \Im]' R_n$$

the columns of the matrix T_n° providing the generalized t-scores and the columns of the matrix E_n° the generalized residual scores, where $\Im$ denotes an MxM identity matrix, and $B_{PLS}^{(n)}$ is the PLS regression matrix.

3. (Currently Amended) ~~The method of claim 1 further comprising~~A method of monitoring an industrial process using a partial least squares approach comprising:

constructing predictor and response matrices from reference data of the process, the predictor matrix being comprised of signals of the manipulated and measured disturbance or cause variables of the process (predictor variables), and the response matrix being comprised of the controlled or effect variables of the process (response variables),

decomposing the predictor and response matrices into rank one component matrices, each of said component matrices being comprised of a vector product in which one vector (the score vector) describes the variation and the other (the loading vector) the contribution of the score vector to the predictor or response matrix,

decomposition being performed by creating a parametric regression matrix based upon iterations of the decomposition of the predictor and response matrices,

characterized by creating a first generalized score vector which describes any significant variation of the process including variations of the predictor and response variables, and a second generalized score vector which represents the prediction error of the partial least squares model and residuals of the predictor matrix,

plotting the first generalized score and the second generalized score over time to generate a monitoring chart for visual display, and

identifying abnormal process behavior, at least in part, by analyzing the residuals of the response variables.

4. (Currently Amended) A method of monitoring a process which comprises configuring a multivariate statistical process monitor by the method of claim ~~1~~2, and identifying abnormal process behavior, at least in part, by analyzing the residuals of the response variables.

5. (Canceled)

6. (Currently Amended) A method of monitoring a process which comprises configuring a multivariate statistical process monitor by the method of claim ~~2~~3, and identifying abnormal process behavior, at least in part, by analyzing the residuals of the response variables.

7. (Currently Amended) A method of monitoring an industrial process by a partial least squares model, comprising:

constructing a predictor matrix from reference data of a process being monitored, the predictor matrix comprising signals of predictor variables;

constructing a response matrix from the reference data of the process being monitored, the response matrix comprising signals of response variables; and

decomposing the predictor and response matrices into rank one component matrices by creating a parametric regression matrix based upon iterations of a decomposition of the predictor and response matrices, each of the rank one component matrices comprising a vector product in which a score vector describes a variation and a loading vector describes a contribution of the score vector to the predictor matrix or the response matrix, characterized by a first generalized score vector which describes any significant variation of the process including variations of the

predictor and response variables, and a second generalized score vector which represents a prediction error of the partial least squares model and residuals of the predictor matrix; and

generating statistical monitoring charts representing variation of predictor and response variables together with their residuals, to detect abnormal situations in the continuous multivariable process, wherein the statistical monitoring charts include:

a T-squared monitoring chart representing variation of the predictor and response variables; and

a Q monitoring chart representing at least variation of residuals of the response variables.

8. (Canceled)

9. (Currently Amended) ~~The system of claim 8,~~ A system for monitoring a continuous multivariable process based on a partial least squares model for which more than two latent variables are retained, including plotting no more than two statistical monitoring charts representing variation of predictor and response variables together with their residuals, to detect abnormal situations in the continuous multivariable process, wherein the ~~two~~ statistical monitoring charts comprise:

a T-squared monitoring chart representing variation of the predictor and response variables; and

a Q monitoring chart representing at least variation of residuals of the response variables.

10. (Currently Amended) The system of claim ~~8~~9, wherein the ~~two~~ statistical monitoring charts have a time base.

11. (Currently Amended) The system of claim ~~8~~9, wherein the response variables are not under closed-loop control with the predictor variables.

12. (Currently Amended) The system of claim ~~8~~9, wherein the multivariate statistical process monitoring system is operable to detect abnormal process behavior that affects mainly the response variables that are not under closed-loop control.

13. (Currently Amended) The system of claim ~~8~~9, wherein a first one of ~~the~~ two statistical monitoring charts is based on a first generalized score vector which describes any significant variation of the process including variations of predictor and response variables, and a second statistical monitoring chart is based on a second generalized score vector which represents a prediction error of the partial least squares model and residuals of a predictor matrix.

14. (Currently Amended) An industrial process monitor comprising a multivariate statistical model of the process, the model having been configured by a partial least squares approach, wherein predictor and response matrices are constructed from reference data of the process, the predictor matrix being comprised of signals of the manipulated and measured disturbance or cause variables of the process (predictor variables), and the response matrix being comprised of the controlled or effect variables of the process (response variables), ~~decomposing~~ the model configured to decompose the predictor and response matrices into rank one component matrices, each of said component matrices being comprised of a vector product in which one vector (the score vector) describes the variation and the other (the loading vector) the contribution of the score vector to the predictor or response matrix, decomposition being performed by the creation of a parametric regression matrix based upon iterations of the decomposition of the predictor and response matrices, the model further configured by the creation of a first generalized score vector which describes any significant variation of the process including variations of the predictor and response variables, and a second generalized score vector which represents the prediction error of the partial least squares model and residuals of the predictor matrix, and the model configured to plot the first generalized score and the second generalized score over time to generate a monitoring chart for visual display, wherein the industrial process monitor is arranged to identify abnormal process behavior, at least in part, by analyzing the residuals of the response variables.

15. (Currently Amended) ~~An industrial process monitor as claimed in claim 4~~ An industrial process monitor comprising a multivariate statistical model of the process, the model having been configured by a partial least squares approach, wherein predictor and response matrices are constructed from reference data of the process, the predictor matrix being comprised of signals of the manipulated and measured disturbance or cause variables of the process (predictor variables), and the response matrix being comprised of the controlled or effect variables of the process (response variables), the model configured to decompose the predictor and response matrices into rank one component matrices, each of said component matrices being comprised of a vector product in which one vector (the score vector) describes the variation and the other (the loading vector) the contribution of the score vector to the predictor or response matrix, decomposition being performed by the creation of a parametric regression matrix based upon iterations of the decomposition of the predictor and response matrices, the model further configured by the creation of generalized t-scores which describe any significant variation of the process including variations of the predictor and response variables, and generalized residual scores which represent the prediction error of the partial least squares model and residuals of the predictor matrix, and the model configured to plot the generalized t-scores and the generalized residual scores over time to generate a monitoring chart for visual display,

wherein the generalized scores are calculated by constructing an augmented matrix, denoted here by Z and of the form $Z = [Y \vdots X]$, where X is the predictor matrix and Y is the response matrix, and constructing a score matrix $T_n = T_n^{\circ} - E_n^{\circ}$ in which T_n° and E_n° are generally of the form:

$$T_n^{\circ} = [Y \vdots X][B_{PLS}^{(n)} \vdots \Im]' R_n$$

$$E_n^{\circ} = [E_n \vdots F_n][B_{PLS}^{(n)} \vdots \Im]' R_n$$

the columns of the matrix T_n^* providing the generalized t-scores and the columns of the matrix E_n^* the generalized residual scores, where $\mathfrak{I}$ denotes an MxM identity matrix, and $B_{PLS}^{(n)}$ is the PLS regression matrix.

16. (Currently Amended) An industrial process monitor as claimed in claim ~~14~~15, which is arranged to identify abnormal process behavior, at least in part, by analyzing the residuals of the response variables.

17. (Canceled)